

A Practical Approach to Human Factors in Maintenance - a Board Member's view

*Bernard Newton
Technical Director
Britannia Airways*

As a Britannia Airways Board Member and more specifically as a Technical Director, I naturally approach maintenance matters and non - technical issues from a practical viewpoint. At a recent conference, Gerry Allen said "An ounce of effort is worth a ton of theory." This presentation represents Britannia's ounce of effort.

As a current A&C type rated engineer, I am acutely aware of the practical vulnerabilities surrounding all of us every day in aircraft maintenance activities. Examples of these being Shift Handovers, night working, worksheets and unrecorded maintenance activities etc. to name but a few, and not least the catch all commercial pressures - real in some cases, perceived in others.

I would like to share with you why we decided to implement a Human Factors programme, how we approached the subject and what we have achieved so far.

I will then recount some of the errors I made and witnessed during my previous life as a hands-on engineer, even though I considered myself, and still do, to be competent and professional in my work.

I will close with some initiatives we are planning for the future in Britannia Engineering & Maintenance.

So let me begin by explaining why we implemented our Human Factors programme.

You will no doubt remember the Aloha Boeing 737 incident which led to research not only into ageing aircraft, but perhaps more importantly into what we now know as Human Factors.

Around this time there followed a number of high profile incidents in the United Kingdom, notably the BAC 1-11 windscreen blowout, the A320 spoiler locked in maintenance mode, and the B737 which suffered total oil loss from both engines following an overnight borescope inspection.

During this period numerous international human factors conferences took place around the world, attended by many in the industry, including our own representative, subsequently to become our Human Factors Manager.

However, after a period of time it was evident to me that the Regulators and Maintenance Bodies were not in themselves going to provide practical solutions. So with this in mind, I decided that it was time to put the talking into positive action.

In order to demonstrate our commitment at Britannia and, perhaps more importantly, gain the commitment and understanding of all of our engineering staff I recruited a full time Human Factors Manager, Peter Pope. This ensured the subject had a high profile and the authority that we felt it deserved for success.

There was no blueprint at this stage other than to do something positive and above all practical, which was to be delivered in such a way that all our staff could readily relate to, whilst substantially increasing awareness of our industry and personal vulnerabilities.

Our first action was to develop policies and procedures for the programme, which included a new approach to dealing with people who inadvertently made mistakes resulting in incidents.

We also created and developed a two-day awareness course as well as a one - day interviewer course for those engaged in the review of incidents. I use the word 'Interviewer' quite deliberately because we are merely trying to establish facts not apportion blame.

In this new environment in which we find ourselves I am still very conscious that we continue to retain clear legal responsibilities placed upon us, but if we want openness and honesty we have also to create a threat free environment.

We delivered our first awareness course back in June 1997 to a selected group of dinosaurs and sceptics to obtain maximum feedback on the practical usefulness of the material. The response was surprisingly positive with no violence experienced!

By the end of 1999, we had completed the training programme for 85% of our staff including contract maintenance engineers. Last year we continued our training programme, and concentrated on refining and re-inforcing our processes.

Early in the change process we recognised that managers' style and behaviour would play a critical part in the acceptance of this new approach by our staff. We had to develop a culture of openness with regard to mistakes. I know we all recognise that people come to work intending to do a good job, like you and me.

I am sure a number of you will recall in years gone by that to make a genuine mistake or error usually led to disciplinary action, driven I would suggest by the lack of knowledge we have available to us today under the heading of human factors.

Whilst this approach works very successfully for 99% of the time, if I am perfectly honest with you there is still the odd occasion where disciplinary action has been sought prior to adopting what we call the human factors approach. i.e. let's get behind the facts of what happened.

Although I am happy to report this is most infrequent, nonetheless we have to keep a close eye on it. Changes in culture, as you will know, do not happen overnight. Moreover, it is in this case about applying a consistent, honest and fair approach to encourage staff to open up and share information, thus helping colleagues avoid repeating the same errors.

To help achieve this, we adapted the Maintenance Error Decision Aid (MEDA) process to suit our environment and trained our Airworthiness staff and other selected staff to use this process and the interview techniques.

These staff, specially trained in interview techniques, will sit down in a threat free environment with those involved in any sort of incident to determine what factors may have led to the mistake being made.

Following which recommendations are made, aimed at preventing re-occurrence of a similar incident.

We use front line staff, not managers, to recommend solutions aimed at preventing a recurrence.

The MEDA process also enables us to analyse the contributors to errors to spot trends and provide focus. The recommendations are then presented to the managers whose area of responsibility it is to implement them, within agreed timescales.

The Airworthiness Review Meeting was established several years ago and comprises various managers who discuss issues such as MORs, ADDs and legislation etc. every month.

Human Factors is firmly on the agenda, where progress on the implementation of improvements is reviewed. I also represent the Engineering & Maintenance Division on our Flight Safety Committee, chaired by our Managing Director.

Any significant issues raised at the ARM meeting are discussed at this level.

The Committee also publishes our safety magazine called 'Feedback' which is distributed to all Departments in the organisation.

We have also developed a quarterly Human Factors newsheet for distribution in the E&M Division.

Our approach to training is fairly simple. As alluded to previously it is about open and honest communication, sharing information and developing an awareness of our vulnerabilities, whilst developing trust between staff and management.

The latter is particularly enforced by myself and my senior General Managers by taking time out where possible to talk to the attendees over the lunch period, and indeed my approach in an informal way, is to talk through why and how we implemented human factors and why it is important to all of us.

I also normally talk about some of the key areas which have led to many incidents and accidents over the years in the maintenance arena such as:-

- Job Cards/Stage Sheets- accuracy and availability of stage sheets is one thing, practical application in some cases on the job is not as easy as it sounds, wheel and brake changes for example.
- Shift Manning control- how can you manage proactively to ensure that at least the agreed manning levels are maintained at any given time? We have developed and implemented a process to minimise short falls to agreed manning levels.
- Quality Assurance out of hours- we know the environment at night time is very different to that which we experience during the day, be it in the Line environment or heavy maintenance. It is a critical part of continued airworthiness and again has to be managed very carefully.
- Last but not least tool control is an area that requires continued effort to ensure tools have not been left particularly in critical parts of the aircraft.

I would also make it clear that human factors is not a panacea for resolving all issues. There is only so much that we can do in Britannia, there are also a lot of issues that industry as a whole needs to address, not least aircraft design and manufacturing that still to this day builds in so many opportunities for mistakes. The two obvious ones being borescope plugs and wheel spacers.

Airport environment and associated byelaws, supported (in some cases) by zealous airport officials, can conspire to lowering of standards. You can of course, read some examples of this in the excellent CHIRP publications.

These are in my opinion just the tip of the iceberg.

Our 2 day Awareness courses have been designed to turn the academics of human factors into a practical language, which can be easily understood and transferred to the workplace. It is highly intensive and involves plenty of participation by the staff.

At the end of my summary I ask for no more than for the attendees to go away and think about what they have learned and to be particularly vigilant in the areas previously alluded to.

I would also take the opportunity to emphasise that ***I would not expect any aircraft to be despatched that is less than fully airworthy. If it doesn't comply, it stays on the ground.***

It is our intention for all of our engineering staff from whichever area they represent to attend this course. This approach I believe, encourages team working. As we all know history is littered with incidents and accidents driven by a chain of events which may have been initiated in a support shop or an administration area.

We encourage internal reporting through our own confidential reporting process but should any member of staff wish to report an event through CHIRP then that is also fine by us. As representatives of CHIRP know, they have our total commitment to this process.

Typically in our classroom you would see a mix of licensed engineers, administration assistants, secretaries, mechanics, staff from Planning and Technical Support, and many others from every corner of the Division.

Several activities are included which require both individual and team work and I would particularly like to re-emphasise teamwork. I passionately believe that this approach will always provide better informed solutions, thus enhancing continued airworthiness while providing significant cost benefits.

We have been pleased to invite other organisations to participate over the years including:

- The Civil Aviation Authority
- British Airways
- British Midland
- British European (formerly Jersey European)
- Shell Aviation
- Bristow Helicopters
- Transavia
- Scandinavian Airlines System
- Cranfield University
- and many others.

We have also participated in delivering the CAA's Human Factors course for Surveyors and Senior Management team.

Now before I summarise and conclude, let me share with you a couple of drop offs I experienced many years ago and how they have played their part in influencing my thinking over recent years, particularly in relation to human Factors.

- B 737 E&E bay door not closed before flight- caused by distraction by the crew asking for a specific fuel load during defect rectification.
- After triple seat change with passengers on board, seat belts not fitted- caused by single - minded focus on the transfer of life jackets, 'serviceable' seats which were often delivered in various configurations and pressure of the moment.

After these and other similar events I spent time mentally punishing myself because I couldn't understand what went wrong. It has taken 23 years for me to understand what happened.

So what do we believe our approach to human factors has achieved?

Through our practical approach we believe we have created -

- an open and honest environment enabling staff to report mistakes and errors without fear.
- a systematic error review process to determine the causes and track improvements.
- a consistent approach to interviewing staff so we can all benefit from the lessons learned
- a means of focussing our efforts to improve our processes and procedures to prevent a re-occurrence
- Awareness of human factor issues at all levels

Using this practical approach, we believe that we can make significant inroads in these areas. It is a continuing learning culture.

So what are our future plans for human factors in Britannia?

- We will continue to develop and evolve our programme in the light of our experiences and developments elsewhere in the industry.
- Continued awareness of human factors principles and lessons learned from incidents, has been integrated into our technical refresher training programme. We also plan to target specific groups of staff for refresher training as it applies to them and their working environment.
- We will continue to refine our quarterly Newsheet for our Engineering and Maintenance staff.
- We are conscious of the fact that other organisations are involved in the maintenance of our aircraft and components, accounting for 63% of our maintenance costs. We will be seeking to promote human factors in such organisations.
- We will also continue to participate in Human Factors initiatives in our industry, and evolve our programme in the light of developments.

We would encourage those involved in the development of JAR 145 and JAR 66 requirements in particular, to adopt a similar practical approach in the drafting and implementation of human factors regulation and the testing of knowledge, and to give credit to those of us who have spent so much time, effort and resources on implementing human factors programmes.

You may be able to tell that I am passionate about human factors, and I truly believe that the practical approach expressed in a way that staff can readily understand will provide a step change in airworthiness - bought about by enhanced understanding and awareness of all the constituent parts of human factors, knowing that each of us can make the difference.